

Renewable Energy Zone Meeting – September 29th 2009

OTEC Resource Data

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OTEC Resource Basics

- OTEC essentially is a baseload technology.
- In loose terms, OTEC is like hydroelectric power.
- Thermal resource (ΔT) plays the role of water head.
- Yet, there is no obvious flow rate constraint.

- Optimized OTEC power is of the form:

$$P_{net} = P_{gross} - P_{loss} = A Q_{cw} (\Delta T)^2 - P_{loss}$$

- Coefficients A and P_{loss} are system specific.
- Typical values: $\Delta T \approx 20^\circ\text{C}$; $P_{loss} \approx 30\%$ of P_{gross} ; $P_{net} \approx 1 \text{ MW}$ for $Q_{cw} \approx 3 \text{ m}^3/\text{s}$.

- A change of 1°C in ΔT roughly leads to a change of 15% in P_{net} .
- The background ΔT characterizes extractable power in the absence of flow rate constraints.
- Around Hawaii, ΔT can be mapped from daily HYCOM+NCODA data ($1/12^{\circ}$ resolution) since late June 2007.

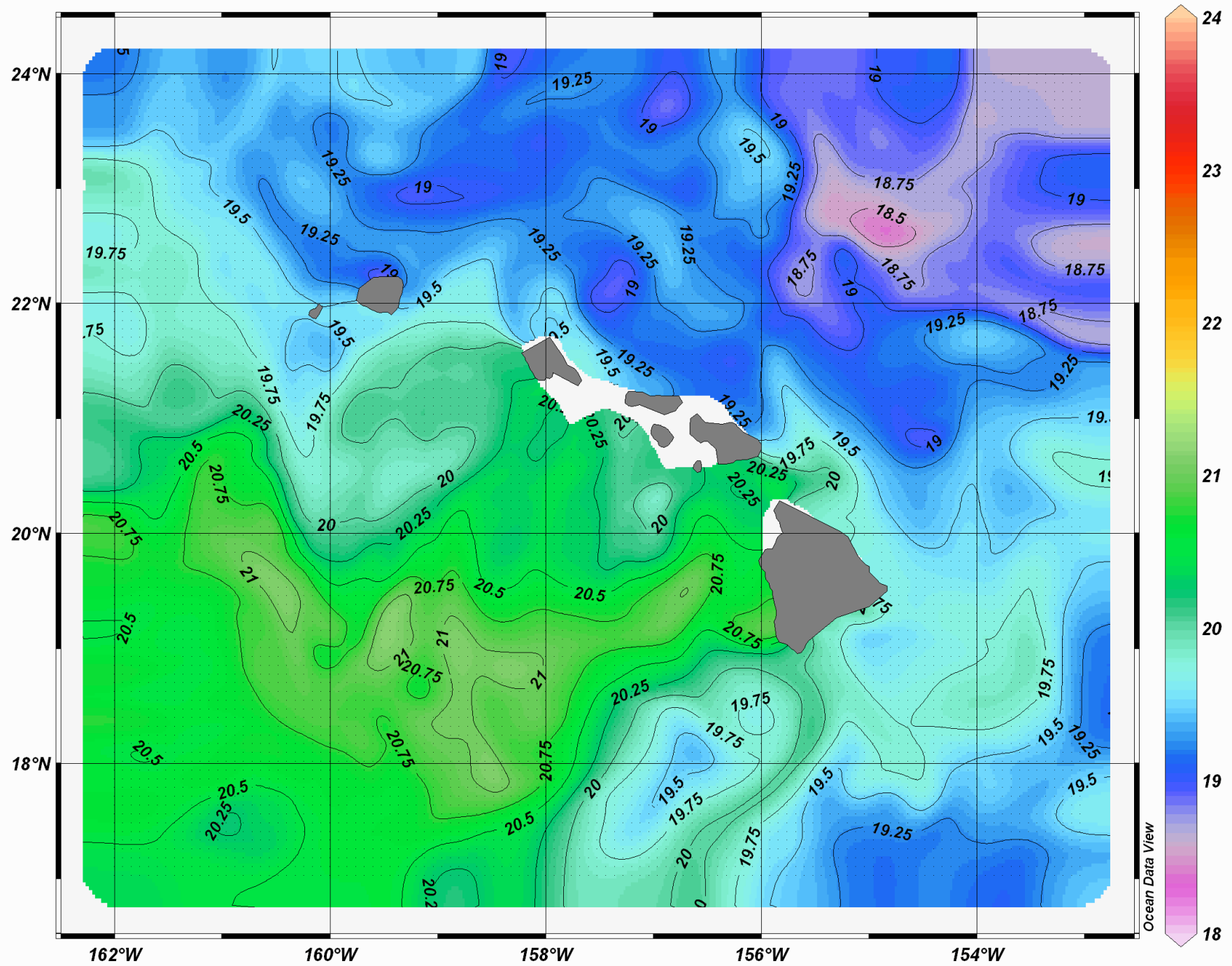
- Examples for ΔT defined between 20 m and 1000 m water depths:

February 1st 2008 ('cool season')

October 1st 2008 ('warm season')

August 2008 (spatial variability)

Temperature Difference [C] @ 20 m and 1000 m=Top



Temperature Difference [C] @ 20 m and 1000 m=Top

